REVIEW OF SECTION VII
OF
CWC REPORT

Prepared for:

Ministry of Forests
Victoria, B.C.

by:

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Vancouver, B.C.
August, 1991

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EXECUTIVE SUMMARY

The accompanying material summarizes the findings of our review of Section VII of the study "Managing British Columbia's Forest Resources: Structural Alternatives, Financial Considerations and Valuation Estimates", written by CWC Canadian Western Capital Ltd. (CWC) and contained in "Background Papers- Volume 4" of the Forest Resources Commission (FRC).

The CWC's primary task was to suggest capital structure options for a Forest Resources Corporation (referred to here as the "Crown Corp.", to avoid confusing the Forest Resources Commission and the Forest Resources Corporation) and to address what the Crown provincial timber resources were worth as an asset base for that proposed corporation. In the process, CWC concluded that stumpage revenues did not capture the full revenue potential of the resource.

Although many differing inferences have been drawn from the CWC report and the FRC's subsequent comments, CWC was very explicit. CWC estimated that stumpage should be higher by between $458 million and $491.9 million. This represents a 64% to 69% increase over the $711 million in total Ministry of Forests (MOF) revenues used by CWC as the base period revenue. This is the only relevant inference which may be drawn about stumpage from the CWC report.

Unfortunately the CWC report contains numerous errors of method, fact and arithmetic. Two of the three approaches used by CWC contained significant errors which, had they not occurred, would have led to dramatically different conclusions. The third method also contains significant errors but more importantly, proceeds from a critical hypothesis without attempting to test that hypothesis. In fact, the data used by CWC contain evidence which contradicts the hypothesis.

When the errors are corrected and the faulty hypothesis rejected, it is apparent that the CWC could not have made the inferences it did about stumpage levels. Instead, CWC's own work would have led it to conclude that, for the period examined, stumpage collected at least the full value of the resource. This is the only inference about stumpage that could legitimately be drawn using CWC's methods, data and assumptions, if CWC had not erred in its analysis.

CWC's conclusions are very sensitive to the assumptions made, and we find some of these assumptions inappropriate or incorrect. However, our conclusions are not based on differences of opinion regarding the assumptions, but on the corrections of the errors in the methods and data used by CWC.

Prepared by F.L.C. Reed and H.M. Saunders, August, 1991

1.0 INTRODUCTION

This report reviews Section VII of the study "Managing British Columbia's Forest Resources: Structural Alternatives, Financial Considerations and Valuation Estimates", written by CWC Canadian Western Capital Ltd. (CWC) and contained in "Background Papers- Volume 4" of the Forest Resources Commission (FRC). The purpose is to examine the assumptions, conclusions and implications regarding the realistic revenue potential of the timber resource. This need arises in part from the study itself, but also to help keep the public well informed in light of often confusing and conflicting inferences drawn from the CWC report.

2.0 BACKGROUND

The question asked of CWC was, what is the value of the Crown provincial timber resource as an asset to be transferred to a proposed Forest Resources Corporation. The terms of reference did not request an analysis of the adequacy of the current level of stumpage revenue collected annually. However, having estimated an asset value, CWC then went on to state that current levels of stumpage do not appear to capture all of the value of the resource, and that to maximize the value of the asset, stumpage rates must rise.

The FRC reiterated this in the body of its report, but did not include it among the 108 numbered recommendations.

Annual MOF revenues rose from $154 million in 1986/87 to $652 million in 1989/90 as a result of policy changes implemented in 1987. The policy changes also imposed costs for silviculture on the forest industry estimated at an additional $200 million annually.

While costs to the industry rose and remain at nearly 6 times 1986/87 levels, total forest industry profits peaked in 1988, and turned to losses in 1990. Losses are estimated to be still greater in 1991. The solid wood processing sector, which holds the licences and pays the stumpage, lost $285 million in 1990, according to the Price Waterhouse 1990 survey.

The apparent incongruity between the CWC findings and the recent state of the industry emphasizes the need for review.

3.0 ANALYSIS OF SECTION VII OF CWC REPORT

3.1 Factors involved in valuing the asset

3.1.1 Why value the asset?

The FRC proposed the Crown Corp. to finance and manage the public's commercial forest land base. The assets under management must be valued in order to assure that the asset base is not depleted for the sake of short term cash flow requirements. The discounted cash flow approach used by CWC is a legitimate valuation technique, but suffers in this instance from two problems. The first is that realistic projection of future cash flows requires a great deal of information about the nature of the remaining resource. Data limitations necessitate simplifying assumptions. The degree of confidence in the accuracy of the result is lessened by the assumption that, in essence, the future harvest will be identical in all respects to recent harvests with no change in harvest regulation, when considerable change is the more likely outcome.

The second and more critical problem is that the discounted cash flow approach may be quite insensitive to physical changes in the resource asset. For example, the same harvest net cash flow can be produced from a forest with a high volume of mature timber, or one with a smaller total volume distributed among a variety of age classes. The discounted cash flow approach would value both forests the same, although they might look quite different. Thus values derived by this technique may be of little use in guiding forest management practices.

In determining the net cash flow on which the valuation is based, it is necessary to make some assumptions about which of the MOF's costs are related to sustaining the current harvest level and which are related to non-commercial values or are not necessary to sustain the current allowable annual cut (AAC). For example, CWC deducted the full current amount of MOF silviculture expenses although the obligation for basic silviculture was transferred to the licensees in 1987, and MOF outlays relate largely to prior harvests, fires, plantation failures, etc. Thus the cost to the MOF of silviculture activities necessary to maintain the AAC on the current land base should be less than the $206 million outlay used by CWC. Silviculture expenses equalled 132% of the net cash flow used to value the asset so even a small reduction in costs would have a profound impact on the net cash flow.

In order to determine the value of an asset from the cash flow it generates, one uses a discount rate or cost of capital. CWC suggested two possible rates, 13.5% and 7.15%, expressed as "real" or after inflation rates. While there is some question as to the appropriateness of these numbers,

the more relevant observation is that the asset value of the resource is nearly doubled if the lower bound of CWC's range of discount rates is used instead of the upper bound.

If one assumed that MOF ultimately will bear only those silviculture costs associated with the Small Business Forest Enterprise Program, or SBFEP, (since other licensees are now required to re-establish a crop on areas they harvest), and one used the lower of CWC's discount rates, then the current value of the asset would be calculated at $4.5 billion rather than CWC's $1.135 billion, without a change in stumpage rates. This wide range of possibilities results from varying only two of many factors needed to calculate a value for the timber asset base. The range would be expanded by introducing other considerations to the calculation.

Based on our analysis of the report, we conclude that valuation of the forest asset by capitalizing the net cash flow from the harvest may be important if the asset is being used as loan collateral, but may provide little or no guidance to resource managers. Moreover the method implies a wide range of possible asset valuations which result from differing cost of capital and net cash flow assumptions, and this merely confuses the public.

3.1.2 Focus on Revenues, not Asset Values

The relevant observation for government, timber administrators and the public is not the magnitude of a highly uncertain asset value, but the stumpage implications. While not CWC's focus, the conclusion is drawn that stumpage is too low and could be increased by $458 million (page 62, in SBFEP Sales Approach, "This would produce incremental stumpage revenue of $458 million.") to $491.9 million (page 58, in Private Sector Sales Approach, "... gives the equivalent pre-tax cash flow of $491.9 million."). It is this 64% to 69% increase in revenues on which all the asset values depend. The suggestion that stumpage collects less than the potential revenue from the resource is the primary concern. The balance of this report therefore focuses on the assumptions, conclusions and implications of Section VII of the CWC report as they relate to the realistic revenue potential of the timber resource.

3.2 Assessment of CWC methods

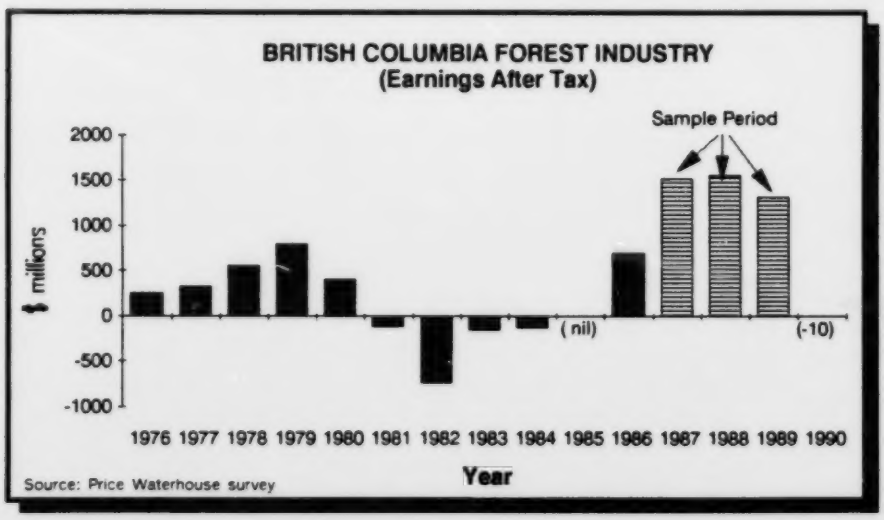
Section VII of the CWC report applies three different methods to estimate the "Market Valuation" of the "assets to be transferred to the proposed Crown Corporation". Two of these, the "Log Market Sales Approach" and the "Small Business Forest Enterprise Program ('SBFEP') Sales Approach",

impute the ability to pay higher stumpage based on limited market transactions. The third method, "Private Sector Sales Approach", assumes that the value of crown forest tenures, usually referred to as "quota", arises solely from undercharging for stumpage. Thus all three approaches are driven by the determination of whether or not stumpage charges collect the realistic revenue potential of the timber resource.

3.3 Log Market Sales Approach

This approach compares the profits from the coast forest industry with those required to earn the 14% nominal (before inflation) rate determined by CWC to be the industry's weighted average cost of capital. Any surplus or shortfall from the "required profit" reflects excess profits available to pay additional stumpage, or excessive stumpage rates, respectively.

The method has some value in determining if the industry was able to pay higher stumpage during the period reviewed, under conditions of the time, but its usefulness declines as time passes and circumstances change. The base period must cover a whole cycle of earnings to produce valid conclusions. CWC used the 1987-89 peak of the earnings cycle for the base period, which is guaranteed to overstate the long run value of the timber. As shown by the accompanying graph, earnings have since collapsed, and conclusions about 1987-89 are not relevant to 1990-91, or to the years before 1987.



Even if the base period used had not disqualified the conclusions, the errors in the approach would have. Several of the errors have minor impact on the results, but others are significant. Among the major errors are that CWC:

- miscalculated average log prices using Vancouver Log Market prices, and then erred in using the data.

- omitted the invested capital of the coast logging and plywood sectors in calculating the "required" level of profits. This is the largest single error source in the calculation.

- miscalculated the average invested capital for the newsprint sector.

- used the after tax cost of capital when CWC should have used the pretax cost. This led CWC to conclude that since actual (pre tax) profits were higher than required (after tax) profits, then industry could afford to pay higher stumpage. This is the second largest error source.

We conclude that CWC's use of a cyclical peak as its base period would overstate the longer term revenue potential from the resource. Even using the peak, if CWC had not made simple errors and omissions in their calculations, it would have been forced by its method and assumptions to conclude that the Crown was receiving at least the full revenue potential of the resource.

3.4 Small Business Sales Approach

CWC used the bonus bid premiums from some of the competitive sales in the Small Business Forest Enterprise Program (SBFEP) to estimate the amount that bidders in a competitive market would be willing to pay as stumpage. The FRC report noted criticisms of the Category 1 and Category 2 competitive sales (the bulk, by volume in the period reviewed by CWC) and recommended that they be phased out. Given this, the conclusions drawn from this approach should be regarded as unreliable, as both the criticisms and the recommended abolition of the competitive sales imply that key assumptions of the CWC analysis were not met.

CWC explored one sample group of sales, but because of small sample size and other factors settled for its "conservative" and base case on the observation that, on average, bid stumpage was

double appraised stumpage. This produced bonus bids materially different from those of the small sample, but consistent with the entire SBFEP.

CWC then deducted those costs of the SBFEP borne by the MOF, which on major licences would be borne by the licensee. CWC observed that the bonus bids, net of additional MOF costs, would yield incremental stumpage revenue of $458 million if applied to the harvest from major licences. However, CWC erred in using only the $2.8 million or $0.30 per m3 current cash cost of silviculture instead of the full $78 million current and accrued program cost which is equivalent to $8.23 per m3 harvested in that year. One could argue for a different allocation, but at the lowest, the program costs at least $6.20 per m3, or 20 times the figure used by CWC. Using the costs charged by the MOF to the SBFEP in CWC's calculation would bring average SBFEP stumpages, net of extra costs, to or below average rates paid on major licences.

This superficial observation is unsound however, as we found that key assumptions were unsubstantiated or wrong, such as that the harvest in the SBFEP was representative of the overall harvest, when appraised stumpage in the SBFEP clearly was significantly different from the average. We also found that calculating by forest region to provide volume weighted instead of simple averages yielded markedly different conclusions, as did using ratios for one year and then for another. Such inconsistencies imply that the results of the analysis are unreliable.

We conclude that erroneous assumptions, untested assumptions, and erratic variability of key data from year to year would negate any conclusions. If these impediments were not enough to invalidate the results, CWC's error in determining the costs borne by the MOF on the SBFEP would have reversed its conclusion that stumpage could be higher. We find it ironic that the FRC, having rejected the Category 1 and Category 2 competitive sales program, used conclusions drawn from the them in its report.

We find the SBFEP approach seriously flawed, and in addition find that if CWC had not erred in calculating the cost of the SBFEP, it would have concluded that the Crown receives at least the full revenue potential of the resource.

3.5 Private Sector Sales Approach

This approach assumes that timber is underpriced and that the amount of the undercharge is captured by the tenure holder. The amount of this undercharge is capitalized and creates the

value of tenure, usually referred to as "quota" value. CWC is explicit that quota would have no value if stumpage were raised to capture the amount of the undercharge. This is not merely a convenient assumption to compensate for weak data, or a matter of honest differences of opinion. This is a major hypothesis that must be stated explicitly and tested before proceeding.

For the hypothesis to be valid, CWC must show that there are no other reasons that might give value to quota. This is not done, although CWC unequivocally asserts that undercharging for stumpage is the sole possible source.

We find plausible explanations consistent with both economic theory and available evidence that do not rely on stumpage being underpriced, and which would explain quota having value even if timber were over priced. (Briefly, the value of stumpage is determined largely by the long run average costs of the marginal producer, while the value of quota is determined by the short run marginal costs of the efficient producer. This hypothesis is at least consistent with the evidence, and suggests that it is impossible to make inferences about the value of stumpage from the price of quota.) Among the transactions examined by CWC were two successive sales of the same company, in which the total price and the portion allocated to quota rose after stumpage was increased in 1987. This contradicts CWC's hypothesis, but is consistent with quota value being largely independent of the level of stumpage. In short the approach used by CWC is without validity.

CWC claimed there was an active market in quota on which to base the analysis. We examined the records supplied to CWC and found that there are few sizeable transactions involving only cutting rights, and these produce a low turnover rate, less than 0.45% annually. This does not constitute an active market. A number of sizeable companies have changed hands, but these were purchased as going concerns, i.e. as an ongoing operation, not something to be broken up and sold piecemeal. The transaction evidence in fact provides useful insight into CWC's assumption that stumpage is underpriced. Measured by commitment volume (quota) over 50% of the quota transfers and 30% of the company sales involved bankrupts or companies reported or known to be financially troubled. The vendors undoubtedly did not think stumpage to be too low.

In its calculations, CWC used data inconsistent with that in reports of public companies cited as the source. In one case CWC used the wrong purchase price, and in another assumed an allocation of the purchase price between quota and mill asset when the actual (and substantially different) allocation was available in the purchaser's financial statements.

The methods used to extrapolate from two sales in each of two regions to the remaining four regions fail logically, there is no consistency year to year in the results of such extrapolation, and the extrapolation ratios used by CWC were not apparent in the data supplied to CWC.

We conclude that quota has value, but that this value does not depend on underpricing of stumpage for its existence. It is also much lower than indicated by CWC's calculation which used incorrect transaction data, but that is irrelevant since CWC's "approach" is based on an hypothesis which is not tested, and is contradicted by the available evidence. A plausible alternative hypothesis consistent with economic theory and transaction evidence suggests that it is impossible to make inferences about the appropriateness of stumpage revenues from quota prices.

3.6 Conclusions re. CWC Methods

Two of the three approaches used by CWC were not inappropriate ways of attempting to estimate the revenue potential. Some of the assumptions were of doubtful validity, but since assumptions were necessary, we treated these as expedients in the absence of adequate data. Unfortunately, there were numerous flaws in the application of the methods, in the calculations and in the data. The extent of the errors is such that when corrected, CWC's conclusion that stumpage does not capture the full value of the resource would have been negated. Recalculating the CWC's own approaches and correcting for errors and omissions, one could only conclude that the Crown received at least the full revenue potential of the resource in the period examined.

The third approach used by CWC was based on a critical hypothesis both untested by CWC and inconsistent with available evidence. That approach also contained data errors which would have altered the results of CWC's calculation, but that is irrelevant as the method has no validity.

The fact that the three different approaches yielded very similar results when all three contained clear and simple errors can only be described as coincidence.

4.0 CONCLUSIONS REGARDING APPROPRIATENESS OF INFERENCES DRAWN FROM THE CWC REPORT

Comparatively few inferences have been drawn from the CWC report, and unfortunately most of them are wrong. In the following paragraphs we have selected some of the more common to illustrate the problem of public perception versus reality.

4.1 Common Inferences

"Forest companies could pay up to eight times more for the trees...", is a representative quote from the press. This inference is unsubstantiated and does not appear in either the CWC or the FRC reports. It is a misinterpretation of a misinterpretation. It is also lacking in plausibility, for stumpage would then cost more than the price of the lumber that could be produced from the tree.

"The (commercial forest resource) asset is worth four to eight times its stumpage set value." This attributes the multiple correctly to the asset value of the commercial timber resource rather than to the stumpage revenue from the annual harvest, but overstates that multiple. The FRC report (page 67) in two separate tables shows the asset value based on "current stumpage" (actually on current net cash flow, i.e. stumpage and other revenues, less costs incurred by the MOF) and that based on "market valuation". The comparisons in the accompanying table indicate that any multiple other than 4.1 times results from comparing values derived from different discount rate assumptions and is incorrect.

COMMERCIAL TIMBER RESOURCE "BASE CASE" VALUATIONS

	Valuation Basis ($ billions)		
	"Current Stumpage Income"	"Market Valuation"	Multiple
discount rate @13.5%	1.14	4.7	4.1x
discount rate @ 11.44%	1.34	5.5	4.1x
discount rate @ 7.15%	2.14 (1)	8.8	4.1x

(1) omitted from FRC table

"a 64% increase in stumpage ... would increase the net by 400%. A 150% raise ... would increase the bottom line by 800%." The inference here is correct, i.e. it is the increase in the MOF's bottom line and not the gross stumpage that determines the value of the asset, and it requires a smaller percentage rise in gross stumpage to effect a large percentage increase in the asset value. However, the 150% and 800% lack any basis in the reports.

"Forest Resources Commission ... recommended increasing stumpage fees ..." The FRC in its report concluded that "Stumpage payments are not capturing the full value of the resource." and "It is the view of the FRC that this 'gap' in valuation should be closed." However, none of the FRC's 108 numbered recommendations addressed the issue. There is no indication in the report why the FRC adopted this view on such a contentious subject, and did not include it in the numbered recommendations.

What did the CWC say about stumpage charges? The magnitude of this purported undercharge was calculated by CWC, but the figures are somewhat inconspicuous as stumpage was not the focus of the report. CWC estimated that stumpage should be higher by between $458 million (page 62, "This would produce incremental stumpage revenue of $458 million."), and $491.9 million (page 58, "... gives an equivalent pre-tax cash flow of $491.9 million."). This represents a 64% to 69% increase over the $711 million in total MOF revenues used by CWC as the base period revenue. These are the only relevant inferences about stumpage levels than can be drawn from the CWC report. These stumpage increases would fill the revenue gap referred to by CWC and provide the basis for the increase in asset value that have led to so much public confusion. Unfortunately, the CWC's conclusion is the result of errors in its own analysis.

4.2 Appropriate Inferences

Our terms of reference were to examine critically the assumptions, conclusions and implications of Section VII of the CWC study and the inferences which have been drawn from it. In our review of the CWC report, we questioned many of the CWC's assumptions, but our task was not to develop independent analysis. In our assessment of the accuracy and appropriateness of the valuation methodologies, we determined several problems:

- the results are extremely sensitive to small changes in the assumptions. This implies a low degree of confidence in the resultant asset value.

- two of the three approaches used by CWC contained significant errors in method, fact and/or arithmetic which, had they not occurred would have led to dramatically different conclusions.

- the third method also contains significant errors but more important, proceeds from a critical hypothesis without attempting to test that hypothesis. In fact, the data used by CWC contain evidence which contradicts the hypothesis.

When the errors are corrected and the faulty hypothesis rejected, it is apparent that the CWC could not have made the inferences about stumpage levels that it did from the methods, assumptions and data that it used. Instead, CWC's own work would have led it to conclude that current stumpage levels collect at least the full revenue potential of the resource. This is the only inference about stumpage that could legitimately be drawn, if the analysis had not erred.

This conclusion is not the result of a difference of opinion about assumptions. CWC's assumptions have been accepted as necessary expedients although we would question the validity of some. The errors are fundamental. Basic arithmetic has only one right answer; numbers which are not the same as those found in the sources cited are wrong; analytic methods must be followed with consistency, one cannot omit portions of the analysis; hypotheses must be identified as such and tested, not taken as fact when there are alternatives and evidence to the contrary.

This review and conclusion has not been gentle in its criticisms of the CWC report. We feel obliged to note that, after exhaustive review of the CWC report, our impression is that this was not intended to be a final report for publication, and that the weight attached to the conclusions, and the inferences drawn by others may have been entirely unwarranted by the circumstances. The methods used were not inappropriate to the terms of reference, but the work was clearly incomplete, in retrospect.